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DEENBANDHU CHHOTU RAM UNIVERSITY OF SCEINCE & TECHNOLOGY, MURTHAL SONEPAT SCHEME OF STUDIES & EXAMINATIONS B.Tech in CIVIL ENGINEERING 8th Semester

Tentative Choice Based Credit Scheme w.e.f. 2021-22

S.				T S	eaching chedule		Marks	Examina Marks	ation			Duratio
No.	Course No.	Course Title	Course Title				of Class work	Theory	Practic al	Total	Credit	n of Exam
1	CE 402C	IRRIGATION	RRIGATION ENGINEERING				25	75	-	100	3	3
2	CE 404C	ENVIRONME	NTAL ENGINEERING -	- II 3	0		25	75	-	100	3	3
3	ECE 404C	INSTRUMEN' TECHNOLOG ENGINEERIN	INSTRUMENTATION AND SENSOR TECHNOLOGY FOR CIVIL ENGINEERING APPLICATIONS				25	75	-	100	2	3
4	CE 406C	DISASTER M	ANAGEMENT	3	-	-	25	75	-	100	3	3
5	CE	DE-III		3	-	-	25	75	11	100	3	3
6	CE	DE-IV		3	-	-	25	75	-	100	3	3
7		DE-III(SP)		4	-	-	25	75	-	100	4	3
8		DE-IV(SP)		4	-	-	25	75	-	100	4	3
9	CE 408C	ENVIRONME LAB	NTAL ENGINEERING -	- II -	- ,	2	25		75	100	1	3
10	ECE- 486C	INSTRUMEN' TECHNOLOG ENGINEERIN	FATION AND SENSOR Y FOR CIVIL G APPLICATIONS LAB	-	-	2	25		75	100	1	3
11	CE410C OR CE412C	SOFTWARE STRUCTURE/ ENGINEERIN OR SOFTWARE HGHWAY EN	APPLICATIONS EARTHQUAKE G LAB** APPLICATIONS IGINEERING LAB**	IN IN		4	25 R	FI	75	100	2	3
12	GFCE402 C	GENERAL FI ENGINEERIN	INESS FOR CIVIL G	0	-	-		- /	75	75	-	3
		Total		2	5 -	8	275	600	300	1175	29	

List Of Departmental Elective I(SP), III(SP), III(SP) & IV(SP) List Of Departmental Elective I, II, III & IV

S.	Code	Subject	S.	Code	Subject
no.			no.		
	STRUCTU	RAL ENGINEERING	1	CE 352C	WATER AND AIR QUALITY MODELING
1	CE 351C	CONCRETE TECHNOLOGY	2	CE354C	ROCK MECHANICS
2	CE 361C	MASONARY STRUCTURES	3	CE356C	GROUNDWATER ENGINEERING
3.	CE 372C	STRUCTURAL ANALYSIS BY MATRIX	4	CE358C	CONSTRUCTION COST ANALYSIS
		METHOD			
4	CE474C	EARTHQUAKE RESISTANT	5	AR318C	BUILDING STANDARDS AND OFFICE
4		STRUCTURES			MANAGEMENT
5	CE476C	DESIGN OF BRIDGES	6	CE360C	LOW VOLUME ROADS
6	CE480C	DYNAMICS OF STRUCTURES	7	CE 362C	GEOTECHNICAL DESIGN
7	CE484C	ADVANCED STRUCTURAL	0	CE364C	BUILDING CONSTRUCTION PRACTICE
		DESIGN AND DETAILING	0		
	EARTHQU	JAKE ENGINEERING	9	CE366C	TRANSPORTATION ECONOMICS
1	CE 351C	CONCRETE TECHNOLOGY	10	CE368C	CONSTRUCTION ENGINEERING
			10		MATERIALS



A Unit of Puran Murti Educational Society Approved by AICTE, Ministry of HRD Affiliated to Deenbandhu Chhotu Ram University of Science & Technology Affiliated to Haryana State Board of Technical Education, Panchkula Recognized Under Section 2 (f) byUGC

2	CE 372C STRUCTURAL ANALYSIS BY MATRIX		11	CE450C	BASICS OF COMPUTATIONAL				
		METHOD	11		HYDRAULICS				
3.	CE474C	EARTHQUAKE RESISTANT	12	CE452	DESIGN OF PRESTRESSED CONCRETE				
		STRUCTURES	12		STRUCTURES				
4	CE480C	DYNAMICS OF STRUCTURES	13	CE454C	CONTRACTS MANAGEMENT				
5	CE484C	ADVANCED STRUCTURAL	14	CE456C	ASSET MANAGEMENT				
5		DESIGN AND DETAILING	14						
	TRANSPO	RTATION ENGINEERING	15	CE458C	GROUND IMPROVEMENT				
1	CE353C	TRAFFIC ENGINEERING AND	16	CE460C	RURAL WATER SUPPLY AND ONSITE				
		MANAGEMENT	10		SANITATION SYSTEMS				
2	CE363C	ENVIRONMENTAL IMPACT		CE462C	INFRASTRUCTRE PLANING AND				
		ASSESSMENT AND LIFE CYCLE	17		DESIGN				
		ANALYSES							
3.	CE365C	HIGHWAY CONSTRUCTION AND	18	CE464C	SOLID AND HAZARDOUS WASTE				
	00000	MANAGEMENT		07.4440	MANAGEMENT				
4	CE374C	DOCK AND HARBOUR ENGINEERING	19	CE466C	CONSTRUCTION EQUIPMENT &				
	CE27CC	AIDDODT DI ANNING AND DESIGN OF		CEACOC					
5	CE3/OC	AIRPORT PLANNING AND DESIGN OF	20	CE408C	WATER POWER ENGINEERING				
6	CE472C	TRANSPORT PLANNING	21	CE470C	ENERGY EFFICIENT BUILDINGS				
7	CE472C	POAD SAFETY AND ENVIRONMENT	21	CE470C	DUBLIC TRANSPORTATION SYSTEMS				
/	CE462C	ADDI JED	ZZ	CE476C	FUBLIC TRANSFORTATION STSTEMS				
8	CE486C	APPLIED STAISTICS TO							
		TRANSPORTATION ENGINEERING							



<u>Campus</u> : Puran Murti Campus, Kami Road, Sonepat - 131001 (Delhi - NCR) - Haryana, India

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CE402C IRRIGATION ENGINEERING

B. Tech. 4th Year (Semester - VIII)

Class Work	:	25 Marks
Examination	:	75Marks
Total	:	100 Marks
Duration of Examination	:	3 Hours

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Course Outcomes :

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At the end of the course, the student will be able to:

Credits

3

CO1	The students gain the knowledge needed on hydrologic cycle and precipitation, design of rain								
	gauge station and estimating of various losses of precipitation.								
CO2	The students will understand the basics of groundwater and hydraulics of subsurface flows.								
CO3	Analyze the water requirement of crops, capacities of Distributaries and Canal.								
CO4	Design a canal irrigation system, cross drainage works and their objectives, analyzes								
	damstructures.								

Prepare CO-PO/PSO Articulation Matrix, e.g.:

	PO1	PO2	PO4	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	1	2	1	2	2	2	2	3	2
CO2	2	2	2	1	-//	-	2	1	2	2	3	3
CO3	2	2	3	1	1	1	2	2	2	1	3	2
CO4	2	2	3	1	1	2	2	1	2	2	3	2

Unit I

HYDROLOGY: Hydrologic cycle, Precipitation: introduction, forms of precipitation, types of precipitation, measurement of precipitation, selection of rain gauge station. Hyetograph and mass curve of rainfall, Evaporation: Definition, factors affecting, measurement, evaporation control. Evapo-transpiration, Infiltration.

Definition, components of hydrographs, unit hydrograph, base flow separation, Prepositions of unit hydrographproblems.

Types of Aquifers – Darcy's Law – Dupuit's Assumptions – Confined Aquifer – Unconfined Aquifer – Recuperation Test – Transmissibility – Specific Capacity – Pumping Test – Steady Flow Analysis Only.

Unit II

Soil-water relationship and irrigation methods: Soil-water relationship, root zone soil water, infiltration, consumptive use, field capacity, wilting point, available moisture in soil, Gross Command Area, CulturableCommand Area, intensity of irrigation, delta, base period, Kor depth, core period, frequency of irrigation, duty of water, relation between delta, duty and base period, irrigation requirement, **Methods of Irrigation-**flooding methods, border strip method, check basin and furrow method, assessment of irrigation water, sprinkler irrigation system.

Canal irrigation:Component of canal distribution system, alignment of channels, losses in irrigation channels, design discharge, silt theories and design of alluvial channels, comparison of Kennedy's and Lacey's theories, canal section and design procedure, Garrets and Lacey's diagrams.

Unit III

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Cross Drainage Works:Classification and their selection, Hydraulic Design Aspects of Aqueducts, Syphon Aqueducts, Super Passage, Canal Syphon and Level Crossing, Design of Canal Transitions.

Diversion Canal Headworks:Various components and their functions, layout plan, selection of site for diversion headworks, Causes of failure of weir/barrages on permeable foundation, Bligh's creep theory, Khosla's method of independent variables, use of Khosla's curves, various corrections..

Unit IV

Regulation works:Canal falls-necessity and location, development of falls, design of cistern element, roughening devices.Design of Sarda type fall.Design of straight Glacis fall. Off-take alignment, Cross-Regulator and DistributoryHeadRegulators, devices to control silt entry into the off-taking channel and Silt Ejector, Canal Escapes.**Dams:** Design principles for gravity and earthen dams

Text Books

- 1. Irrigation, Water Resources and Water Power Engg. byP.N.Modi.
- 2. Fundamentals on Irrigation Engg. by Bharat Singh

Reference Books

- 1. Irrigation Engg& Hydraulic Structures by S.K.Garg.
- 2. Irrigation Engg. byS.K.Sharma.

CE 404C : ENVIRONMENTAL ENGINEERING – II

B. Tech. 4th Year (Semester – VIII)

L	Т	Р	Credits	Class Work	:	25 Marks
3	0		3	Examination	:	75Marks
				Total	:	100 Marks
				Duration of Exam.	:	3 Hours

1. Course outcomes:

Upon successful completion of the course students will be able to

CO1	Determine the characteristics of sewage, its variation in flow due to weather and design
	of sewer.
CO2	Design sewage treatment units and understand their operation and maintenance.
CO3	Plan the most appropriate techniques' for the wastewater disposal on land and in to
	groundwater.
CO4	Design the low cost wastewater treatment units for sewage disposal.

2. Prepare CO-PO/PSO Articulation Matrix, e.g.:

	PO1	PO2	PO3	PO4	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	3	1	3	3	1	3	2	3	3	3	3
CO2	3	3	3	2	3	3	2	3	1	3	2	3	3
CO3	3	3	3	3	3	3	3	2	3	3	3	2	1
CO4	3	2	3	3	3	3	3	3	3	3	3	3	3



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Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) If there is no correlation, put "-"

UNIT – I

Sewerage system: Generation and Estimation of Community Sewage; Flow variations; Storm Water flow; Alternate systems for sewage collection and conveyance; Design of sewers; operation and maintenance of sewers,

Characterization of sewage: Parameters for characterization; Sampling, testing and analysis of sewage; Relative stability and population equivalent; BOD and BOD kinetics.

UNIT – II

Treatment of sewage: Effluents standards; Basic principles of sewage treatment; Introduction to unit operations and processes - primary treatment units such as screening, grit chamber, and Sedimentation tanks. Secondary treatment units such as different types of aerobic suspended and attached growth systems, and tertiary treatment Sludge Handling and disposal – thickening, stabilization, dewatering, drying and disposal UNIT – III

Sewage treatment units design: ASP, TF, and Pollution due to improper disposal of sewage, Government authorities and their roles in sewerage disposal

Treated effluent disposal: Disposal into surface water bodies; Reuse for irrigation and aqua-culturing; Land disposal; Disposal through injection into groundwater, Indian standards for disposal of effluent.

UNIT - VI

Low cost sanitation systems – Imhoff tanks, septic tank, stabilization ponds; oxidation ponds; and constructed wetland systems.

Pumping: Sewage pumping and pumping stations, Sewer connections for houses and buildings, Sewer appurtenances; Construction, testing and Maintenance of sewers;

Text Books

1. Manual on Water Supply and Treatment by Ministry of Urban Development, New Delhi.

2. Water Supply and Sewerage, McGhee, McGraw Hill.

3. Environmental Engineering, Vol. I, S.K. Garg, Khanna Publishers, New-Delhi.

References Books

1. Environmental Engineering Peavy, Rowe and Tchobanglous, McGraw Hill.

2. Water and Waste Water Engineering (Vol. 1&2), Fair, Geyer &Okun, John Wiley, New York.

3. Water Supply Engineering P.N. Modi, Standard Book House New-Delhi.

4. Standard Methods for the Examination of Water and Waste Water, American Public Health Association

ECE 406C :INSTRUMENTATION AND SENSOR TECHNOLOGIES FOR CIVIL ENGINEERING APPLICATIONS

B. Tech. 4th Year (Semester – VIII)

L	Т	Р	Credits	Class Work	:	25 Marks
3	0		3	Examination	:	75Marks
				Total	:	100
						Marks
				Duration of	:	3 Hours
				Examination		

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Course Outcomes:

- · Understand the principles of operation and characteristics of instrumentation and integrated sensor systems
- · Understand right use of sensors and instruments for differing applications along with limitations
- · Recognize and apply measurement best practice and identify ways to improve measurement and evaluation

 \cdot Troubleshoot and solve problems in instrumentation and measurement systems and to instill and encourage a questioning culture.

Unit-I

Fundamentals of Measurementand Transducers: Measurement and measuring system, Significance of measurements, methods of measurement, Direct and indirect methods: Classification of instrument, Application of measuring system. Transducers: Introduction, primary and secondary transducers, Active and passive transducer, analog and digital transducer.

Unit-II

Transducers Technologies and Data acquisition: Types of Transducers: Measurement of Strain :Strain Gauge, Stress-Strain relationship, Thermocouples, Measurement of vibration: *LVDT*, RVDT, Measurement of Thickness, capacitive & resistive transducers, piezo-electric transducers, Hall Effect Transducers, Opto-Electronic Transducers, transducers. *Dataacquisition*: Data Acquisition Systems, Analog/Digital/Analog conversion Techniques, General consideration of A/D and D/A conversion, A/D and D/A convertors,.

Unit-III

Sensing and Instrumentation: Introduction, Basics of Sensors, Primary Sensing Elements, calibration of measuring sensors and instruments: principles of calibration, control of calibration environment, Smartsensors, communication & computation in smart sensors.

Unit-IV

Application of Sensor Technologies: Success stories related to: RFID use at Toll plaza, traffic signal regulation, beam defects detection, stress-strain measurements, automobile speed regulation.

Text/Reference Books:

1. A.K Sawhney(1997), Electrical & Electronics Measurement and Instrumentation ,Dhanpat Rai & Co. Ltd.

2. Alan S Morris (2001), Measurement and Instrumentation Principles, 3rd/e, Butterworth Hienemann

3. S K Singh, Industrial Instrumentation and Control,3rd/e, Tata McGraw Hill

4. S. Tumanski (2006), Principle of Electrical Measurement, Taylor & Francis

5. J.S. Saini, Text Book of Measurements and Instrumentation, New Age International Publishers

CE406C : DISASTER MANAGEMENT

				B. Tech. 4 th Year (Semester – VIII)		
L	Т	Р	Credits	Class Work	:	25 Marks
3	-		3	Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Outcomes :

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At the end of the course, the student will be able to:

CO1	Knowledge of the significance of disaster management,
CO2	Analyze the occurrences, reasons and mechanism of various types of disaster
CO3	Understand the preventive measures as Civil Engineer with latest codal provisions
CO4	Apply the latest technology in mitigation of disasters

Prepare CO-PO/PSO Articulation Matrix, e.g.:

	PO1	PO2	PO3	PO4	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	2	2	1	-	1	1	1	-	2	3	2
CO2	3	3	1	2	1	1	1	1	2	1	1	1	3	2
CO3	2	2	3	2	2	2	-	1	-	2	-	2	3	2
CO4	2	2	3	1	1	1	2	1	1	1	-	2	3	2

Unit-I

Introduction to Disaster Management: Disaster, Emergency, Hazard, Mitigation, Disaster Prevention, Preparedness and Rehabilitation, Risk and Vulnerability, Classification of Disaster, Natural and Man-made Disasters, International day and Decade of Disaster Reduction.

Risk and Vulnerability to disaster mitigation and management options: Warning and Forecasting.

Unit-II

Hydro-meteorological based disasters I: Disaster Management Act 2005, Role of NDMA, NDRF, NIDM, Tropical Cyclones, Floods, droughts, mechanism, causes, role of Indian Metrological Department, Central Water Commission, structure and their impacts, classifications, vulnerability, Early Warning System, Forecasting, Flood Warning System, Drought Indicators, recurrence and declaration, Structural and Non-structural Measures.

Hydro-meteorological based disasters II: Desertification Zones, causes and impacts of desertification, Characteristics, Vulnerability to India and Steps taken to combat desertification, Forest Fires; Causes of Forest Fires; Impact of Forest Fires, Prevention.

Unit-III

Geological based disasters: Earthquake, Reasons, Compression, Shear, Rayleigh and Love Waves; Magnitude and Intensity Scales, Direct and Indirect Impact of Earthquake; Seismic Zones in India, Factors, Indian Standards Guidelines for RCC and Masonry Structures, Prevention and Preparedness for Earthquake, Tsunamis, Landslides and avalanches: Definition, causes and structure; past lesson learnt and measures taken; their Characteristic features, Impact and prevention, Atlas (BMTRPC); structural and non structural measures.

Unit-IV

Manmade Disasters I: Chemical Industrial hazards; causes and factors, pre- and post disaster measures; control ; Indian Standard Guidelines and Compliance;

Traffic accidents; classification and impact, Fire hazards; Classification as per Indian Standards;

Fire risk assessment; Escape routes; fire fightingequipments; classification of buildings, fire zones, occupancy loads; .capacity and arrangements of exists,

Use of remote sensing and GIS in disaster mitigation and management.

Text Books

- 1. Thomas D. Schneid., Disaster Management and Preparedness, CRC Publication, USA, 2001
- 2. Patrick Leon Abbott, Natural Disasters, Amazon Publications, 2002
- 3. Ben Wisner., At Risk: Natural Hazards, People vulnerability and Disaster, Amazon Publications, 2001



- 4. Oosterom, Petervan, Zlatanova, Siyka, Fendel, Elfriede M., "Geo-information for Disaster Management", Springer Publications, 2005
- 5. Savindra Singh and Jeetendra Singh, Disaster Management, Pravalika Publications, Allahabad
- 6. Nidhi GaubaDhawan and AmbrinaSardar Khan, Disaster Management and Preparedness, CBS Publishers & Distribution

Reference Books

1. Selected Resources Published by the National Disaster Management Institute of Home Affairs, Govt. of India, New Delhi.

CE 408C : ENVIRONMENTAL ENGINEERING - II LAB

\mathbf{L}	Т	Р	Credits	Class Work	:	25 Marks
0	0	2	1	Practical	:	75Marks
				Total	:	100 Marks
				Duration of Exam.	:	3 Hours

Course objectives:

To study about the physical and chemical characteristics of wastewater.

To study the test procedures and measurement of concentration of waste water parameters.

Course outcomes:

Upon successful completion of the course students will be able to

CO1	Determine the characteristics of sewage and their concentration.
CO2	Measure the sewage parameters.

1. <u>Prepare CO-PO/PSO Articulation Matrix, e.g.</u>:

	10		1.54	-	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	
	la La	PO1	PO2	PO4	PO6	PO7
5	CO1	2	3	3	3	3
	CO2	2	3	3	3	3

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) If there is no correlation, put "-"

List of Experiments

- 1. Physical Characterization of wastewater: Turbidity, Electrical Conductivity, pH
- 2. Analysis of solids content of water: Dissolved, Settleable, suspended, total, volatile,

inorganic etc.

3. Alkalinity

4. Analysis of ions: chloride



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5. Analysis of ions: sulfate

- 6. Chemical Oxygen Demand (COD)
- 7. Dissolved Oxygen (D.O) and
- 8. Biochemical Oxygen Demand (BOD)
- 9. Determination of SVI (including MLSS and MLVSS estimations).
- 10. Determination of Nitrite and Nitrate nitrogen.
- 11. Visit to waste water treatment plant.

	CE410C: \$	SOFTV	VARE	PPLICATIONS IN STRUCTURE/EARTHQUAKE ENGINEERING LAB	
L	Р	Cre	edits	Class Work : 25 Marks	
	04	2		Examination : 75 Marks	
				Duration of Exam 3 I	Hrs
Course	e Objective	s: To s	tudy the	design and detailing software tools.	
Cou	rse Outcon	nes: A	t the en	of the course, students will be able to use the software like Auto Cad and Sta	aad
Pro e	effectively.				
S	Syllabus Co	ontent			
				1. Design of beams using excel work sheets	
				2. Design of columns using excel work sheets	
				3. Modeling of structures usinge-tab	
				4. Modeling of structures usingStaad Pro	
				5. Loading over structures usingStaad Pro	
				6. Loding over structures usinge-tab	
				7. Assigning Load-combinations over structures using Staad Pro	
				8. Assigning Load-combinations over structures usinge-tab	
				9. Designing structures usingStaad Pro	
				10. Designing structures usinge-tab	
				11. Design and detailing of $G+5$ storey building considering all the loads per IS Codes.	s as

CE412C: SOFTWARE APPLICATIONS INHIGHWAY ENGINEERING LAB

- L P Credits
 - 4 2

Class Work 25 Marks Examinations 75 Marks Duration of Exam 3 Hrs

COURSE OBJECTIVES

- 1. To study various drafting and road design software.
- 2. To perform road design using software.

List of experiments:

<u>Campus</u>: Puran Murti Campus, Kami Road, Sonepat-131001 (Delhi-NCR) - Haryana, India

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- 1. Basics of AutoCAD
- 2. Alignment Design using MXRoad
- 3. Horizontal Alignment using MXRoad
- 4. Vertical Alignment using MXRoad
- 5. L-Section, cross section and earth work calculations using MXRoad
- 6. Design of pavement using IIT Pave
- 7. Introduction to GIS software
- 8. Introduction to Traffic simulation software: VISSIM/VISSUM and other software in Highway Engineering
- 9. Analysis of accident data using excel worksheets
- 10. Statistical modeling using SPSS

Notes:

- 1. Each Laboratory Class/Section shall not be of more than about 20 students.
- 2. To allow fair opportunity of practical hands-on experience to each student, each experiment may either be done by each student individually or in a group of not more than 3-4 students. Larger groups be strictly discouraged / disallowed.
- 3. Pre-experimental & post experimental quiz / questions may be offered for each Lab experiment to reinforce & aid comprehension of the experiment.

COURSE OUTCOMES

After completion of this students will be able to

- 1. Acquire understanding of various drafting and designing capacities of software.
- 2. Design horizontal and vertical alignment
- 3. Understand the importance of GIS in highway designs

ECE486C Instrumentation & Sensor Technologies for Civil Engineering Applications lab

L	Т	Р	Credits	Class Work	: 25
0	0	4	2	Examination	: 75
				Total	: 100
				Duration of Exam	: 3 Hours

LIST OF EXPERIMENTS:

- 1. Measurement of Displacement using LVDT.
- 2. Measurement of Distance using LDR.
- 3. Measurement of Temperature using R.T.D.
- 4. Measurement of Temperature using thermocouple.
- 5. Measurement of weight using Strain Gauge.
- 6. Measurement of Pressure using piezo-electric pick up.
- 7. Measurement of Distance using Inductive and Capactive pick up.
- 8. To measure pressure using Pressure transducer.
- 9. Measurement of Speed of DC motor using Magnetic pick up.
- 10. To measure frequency and time period of given waveform using frequency meter.

Text/Reference Books:



1. A Course in Electrical and Electronics Measurements and Instrumentation by A.K.Sawhney, Dhanpat Rai & Sons

2. Electronics Measurements and Instrumentation Techniques by Helfrick& Cooper, Pearson Education, 2015.

3. J.S. Saini, Text Book of Measurements and Instrumentation, New Age International Publishers

Course Outcomes: At the end of the course, students will be able to:

1. Students get hands on training on various transducers used in various industrial applications.

2. They will understand apt use of all the principles of a transducer for proper design and improvement in various transducers applications.

3. They learn to explore the various aspects of measurement and applications of CRO.

4. The students will become creative and will channelize and mobilise their skills for underdeveloped instrumentation sectors like rural areas.

GFCE 402C: GENERAL FITNESS FOR THE PROFESSION

B. 7	ech. S	Semes	ster – VIII (Civil Engineering)		
L	Т	Р	Credits	Examination	: 75 Marks
				Total	: 75 Marks

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

The evaluation will be made by the committee of examiners constituted as under:

- 1. Chairperson
- 2. External Expert
- 3. Student Coordinator

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

I.	Academic Performance	(10Marks)
II.	Extra Curricular Activities / Community Service, Hostel Activities	(10 Marks)
III	Technical Activities / Industrial, Educational tour	(10 Marks)

IV Sports/games (10Marks)

Note: Report submitted by the students should be typed on both sides of the paper.

- B. A student will support his/her achievement and verbal & communicative skill through presentation before the examiners. (15 Marks)
- C. Faculty Counselor Assignment

(20 Marks)



It will be the duty of the student to get evaluated by respective faculty counselor and to submit the counselor assessment marks in a sealed envelope to the committee.

A counselor will assess the student which reflects his/her learning graph including followings:

- 1. Discipline throughout the year
- 2. Sincerity towards study
- 3. How quickly the student assimilates professional value system etc.

CE450C :BASICS OF COMPUTATIONAL HYDRAULICS B. Tech. Final Year (Semester – VIII)

L	Т	Р	Credits	Class Work	:	25 Marks
3	-		3	Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Outcomes

On completion of the course the student will be able to

- 1. Understand basics of Computational Hydraulics and various numerical methods.
- 2. Understand various type of flows, flow through pipe and channels.
- 3. Understand Ground water flow, surface water flow.
- 4. Understand concept of pressurized Conduits and various types of losses in pipe flow.

UNIT -I

Introduction: Computational hydraulics in the context of civil engineering problems. e.g., groundwater flow, open channel flow and flow in closed conduits.

Numerical Methods: Overview and Mesh Generation, Finite Difference Method, Finite Volume Method, Mesh Reduction Methods, Traditional method, reservoir routing, Richardson extrapolation, higher order method

UNIT II

Conservation Laws, Critical Flows, Uniform Flows, Gradually Varied Flows, Rapidly Varied, Unsteady Flows, Flow through pipe and channels.

UNIT- III

Groundwater Flow, Surface Water Flow: Open Channel Flow, Surface Flooding, Over Hydraulic Structures

UNIT- IV

Flow in pressurized conduits, interaction of different types of flow, various types of losses in pipe flow.

Refrences

1. Abbott M.B., Minns A.W., (1979) Computational Hydraulics, London: Pitman

- 2. Chaudhry M H, Applied Hydraulic Transients (2014), Springer, New York.
- 3. Chaudhry M H, Open-Channel Flow (2008), 2nd edition, Springer, New york.
- 4. Christopher G Koutitas, (1983) Elements of Computational Hydraulics, Pentech Press, London.
- 5. Chung T. J., (2002) Computational Fluid Dynamics, Cambridge University Press, Cambridge.

6. Cunge J.A., Holly F. M., Verway A., (1980) Practical Aspects of Computational River Hydraulics, Pitman Publishing Ltd. Melbourne.

7. Ferziger J. H., Peric M. (2008) Computational Methods for Fluid Dynamics, 3rd Edition, Springer, New Delhi.

8. Jeppson R. (2011) Open Channel flow- Numerical Methods and Computer Applications, CRC Press, NW.

BOOKS -

- 1. Computational Hydraulics-John Fenton
- 2. Computational Hydraulics Vreugdenhil, Cornelis B



CE 452C : DESIGN OF PRESTRESSED CONCRETE STRUCTURES

B. Tech. 4th Year (Semester -VIII)

L T P Credits 3 - -- 3

:	25 Marks
:	75Marks
:	100 Marks
:	3Hours
	: : :

111

Course Outcomes :

At the end of the course, the student will be able to:

CO1	Use the concepts of pre-stressed concrete systems, dealing with load analysis.
CO2	Analyseprestress losses due to creep, shrinkage etc.
CO3	Analyze and design pre-stressed concrete members such as slabs and beams.
CO4	Design the compression and tension members using prestress methodology.

Prepare CO-PO/PSO Articulation Matrix, e.g.:

	PO1	PO2	PO3	PO4	PO6	PO8	PO9	PO10	PO 11	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	1	1	1	2	2	2	2
CO2	2	2	1	2	1	- (2	2	1	1	2	2
CO3	3	2	2	1	1	1	-	2	2	1	2	2
CO4	2	2	2	1	1	1	2	1	2	2	2	2

UNIT I

Introduction: Basic concepts of prestressing, terminology, advantages and applications of prestressed concrete. Materials for Prestressed Concrete: High strength Concrete, permissible stresses in concrete, high strength steel, permissible stresses in steel. **Prestressing Systems**: Prestensioning and post tensioning systems, various types of tensioning devices, Lec-Macall systems, MagnelBlaton post tensioning, Freysinet systems, Gifford Udal system.

UNIT II

Losses of Prestress : Types of losses of prestress, loss due to elastic deformation of concrete, loss due to shrinkage of concrete, loss due to creep of concrete, loss due to relaxation of stress in steel, loss due to friction, loss due to anchorage slip, total loss in pretensioned and post tensioned members. **Analysis of Prestress and Bending stresses**: Basic assumptions, resultant stresses at a section, concept of load balancing, cracking moment.

UNIT III

Deflections: Factors influencing deflections, short term deflections of un-cracked members, deflections of cracked members, prediction of long term deflections. **Shear and Torsional Resistance**: Ultimate shear resistance of prestressed concrete members, prestressed concrete members in torsion, design of reinforcements for torsion, shear and bending.

UNIT IV

Design of Flexural Members: Dimensioning of flexural members, design of pre-tensioned and post tensioned beams, design of partially prestressed members, design of one way and two way slabs, continuous beams.Design for axial tension, compression and bending, bond and bearing.

Text Books

- 1. Prestressed Concrete by N. Krishna Raju, TMH Publishing Company, New Delhi,
- 2. Prestressed Concrete by P. Dayartnam, Oxford and IBH Publication, New Delhi.

Reference books

1.Design of PrestressedConcreet Structures by T Y Lin& Ned H. Burns

CE 454C :CONTRACT MANAGEMENT



111

L T P Credits

3 -- -- 3

B. Tech. 4th Year (Semester-VIII) Class Work : 25 Marks Examination : 75 Marks Total : 100 Marks Duration of Examination : 3 hours

Course Outcomes:

Students will know about

1: Quantity surveying before contract management.

2:Various disputes that could arise in construction and dispute resolution technique like arbitration. **3:**Labour management.

4:Different components of contract.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	-	-	3	2	2	3	2	1	1	3	2	2	2
CO2	1	1	-	-	2	3	2	3	2	3	1	3	3	3	3
CO3	1	1	-	-	3	3	2	1	2	3	2	3	3	3	3
CO4	1	1	-	-	1	2	2	2	1	1	2	3	2	3	3

Unit-I

Quantity Surveying: Basic principles of estimating. Construction costs. Different methods and stages of estimating. Specification of construction items and method of statement. Principles of rate analysis and valuation. **Unit-II**

Claims and Arbitration: Indian contract act and arbitration act. Variations in work and conditions. Claims and disputes. Liquidated damages. Rights. Responsibilities and duties of client (Owner). Architect. Engineer. Contractor etc. Purchase order as contracts insurance contract and claims.

Unit-III

Legal Frame Work of Construction: Contract labors act 1970 and other acts and laws relating to labors management. Wages.Bonus and Industrial disputes.

Construction Contracts: International contract rules and regulation.

Unit-IV

Contract Conditions: Important contract clauses.Terms of payments.Retention.Acceptance and final payment.Time of completion.Extension of time.Maintenance period etc.

Special Contracts: BOT projects, Variation in BOT projects. Infra structural projects.

Reference Books

1. Estimating and Costing by B.N. Dutta

2. Estimating and Costing by G.S. Birdie



3. Estimating and Costing by Chakaraborty

CE456C :ASSET N	JANAGEMENT
B. Tech. 4 th Year ((Semester-VIII)

L	Т	Р	Credits
-			-

3 3 Year (Semester-VIII) : 25 Marks **Class Work Examination** Total **Duration of Examination** : 3 hours

:75 Marks : 100 Marks 111

Course Outcomes:

Students will know about:

- 1: Basics of Asset Management.
- 2: Strategies of financing public works.
- 3: Performance modeling.
- 4: Role of concrete and steel in infrastructure

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	-	-	3	3	2	3	2	1	2	2	3	3	3
CO2	1	1	-	-	2	2	2	1	2	2	1	3	2	3	3
CO3	3	3	-	-	3	3	3	2	1	2	3	3	2	3	3
CO4	1	2	-	-	3	2	2	1	2	1	2	2	2	2	2

Unit-I

Basic discussion of concepts of infrastructure assets and their management, Performance of infrastructure assets, stakeholders involved, along with factors affecting the demand and supply of public works services; relating infrastructure and economic development;

Unit-II

Strategies for financing public works; performance indicators and measures; Framework for Infrastructure Management: Design for reliability, maintainability, supportability, and service life; Inventory and database management; Condition assessment

Impact of failure, risk analysis, monitoring, performance, resilience, service life, repair, condition assessment, non-destructive testing and evaluation

Unit-III

Performance modeling and failure analysis; Maintenance strategies, Life-cycle cost and benefits analysis; Introduction to the basic policies and initiatives of the Government in the area of infrastructure asset creation and management (JNNURM, Smart cities, etc.).

Case studies including Bridge Management Systems, Pavement Management System, Pipeline management, Hydro-system Asset Management

Unit-IV

Concrete and Steel in Infrastructure - Concrete and Steel engineering practices, Quality control, Codal provisions, Durability of concrete and steel under special conditions, elevated temperature, nuclear emissions,



extreme exposure conditions such as sea water attacks, freeze-thaw condition, ground water exposure, etc. Infrastructure Corrosion – Repair and Rehabilitation of Concrete and steel Structures, Non-destructive testing of concrete

Reference Books:

- 1. Public Infrastructure Asset Management, Second Edition (P/L Custom Scoring Survey) by Waheed Uddin and W Ronald Hudson
- 2. Infrastructure Reporting and Asset Management: Best Practices and Opportunities by AdjoAmekudzi, Ph.D.; and Sue McNeil, Ph.D., P.E.
- 3. Asset Management for Infrastructure Systems- Energy and Water by Balzer, Gerd, Schorn, Christian
- 4. Public Infrastructure Asset Managementby Waheed Uddin.
- 5. Infrastructure Management: Integrating Design, Construction, Maintenance, Rehabilitation, and Renovation by W. Ronald Hudson.

NOTE: 1.For the semester examination, nine questions are to be set by the examiner. Question no. 9, containing 5-7 short answer type questions, will be compulsory & based on the entire syllabus. Rest of the eight questions are to be set by setting two questions from each of the four units of the syllabus. The candidates will be required to attempt five questions in all, selecting one from each unit AND Question no. 9. All questions will carry equal marks.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing / ex-change of calculator or any other items are prohibited in the examinations. No programmable calculators, mobile phones or other electrical/ electronic items are allowed in the examination.

NOTE: For examiner for paper setting:- In semester examinations, examiner is required to set up question paper covering the entire syllabus in accordance with the examination reforms circulated by the AICTE & approved under item No. 14_18 of academic council.

CE458C : GROUND IMPROVEMENT B. Tech. 4th Year (Semester - VIII)

			D. ICCII. 4. ICal	(Semester - VIII)		
Т	Р	Credits		Class Work	:	25 Marks
-		3		Examination	:	75Marks
			CAM	- Total	:	100 Marks
				Duration of Examination	:	3 Hours
	Т -	T P 	T P Credits 3	T P Credits 3	T P Credits Class Work - - 3 Examination Total Duration of Examination	T P Credits Class Work : - - 3 Examination : Duration of Examination : Duration of Examination :

<u>Course Outcomes</u> :Upon successful completion of the course, the students will be able to:

CO1	Understand the need, mechanism and importanceof ground improvement.
CO2	Apply appropriate method of ground improvement as per requirement of the soil
	properties.
CO3	Apply appropriate method of Soil Reinforcement, Anchored Earth or Soil Nailing, Grouting etc.
CO4	Design the reinforced earth retaining walls, abutments, earth slopes etc.

<u>CO-PO/PSO Articulation Matrix</u> :

	PO1	PO2	PO4	PO6	PO7	PO8	PO9	PO10	PO11	PSO2	PSO3
CO1	3	3	1	2	1	2	2	2	2	2	1
CO2	2	3	1	3	1	2	1	1	2	2	1
CO3	2	2	2	3	1	1	2	1	1	1	1
CO4	2	1	1	3	2	1	2	2	2	1	1

UNIT I

Introduction to different methods of ground improvement and its importance.Mechanical method of ground improvement, Ruthfuch method; methods based on PI.



Ground Freezing, methods, Hydrogeology of frozen soils, strength and behaviour of frozen soils.Ground heating, effect on soil properties, methods.

UNIT II

Drainage Techniques, filter drains, sand drains, sandwicks& band drains, lime columns. Electro-osmosis and Electrochemical stabilization.

Compaction & consolidation techniques viz. pre-compression, compaction piles, vibro-compaction (Vibro-floatation, Terra-probe, vibro-replacement, concrete columns &vibro-displacement), Dynamic compaction, explosive compaction.

UNIT III

Soil Reinforcement, load transfer mechanism, strength development, anchored earth. In-situ reinforcement techniques viz soil nailing, reticuledmicropiles, soil dowels and anchors.

Grouts, properties, penetration, clay, cement clay, cement, clay-chemical, chemical and Bituminous grouts, grouting methods viz penetration, claquage, compaction & jet.

UNIT IV

Reinforced earth; Introduction, Mechanism of reinforced types of reinforcement strength characteristics.Design of reinforced earth retaining walls, abutments, earth slopes.

Exclusion techniques viz. sheet piles, contiguous bored piles, secant piles, slurry trenches. Diaphragm walls.Design of stone columns.

Text Books

- 1. Ground Improvement Techniques by P. Purushotham Raj, Tata McGraw Hill, ND.
- 2. Engineering Treatment of Soils by F.G. Bell, E & FN Spon Publishers, UK.

Reference Books

- 1. Engineering Principles of Ground Modification by M.R. Hausmann, McGraw Hill Publishers, New York.
- 2. Ground Improvement Techniques & their Evolution by W.F. Van Impe., A.A. Balkema Publishers, Netherlands.
- 3. Koerner, R.M., Construction & Geotechnical methods in foundation engineering, MGH, New York, 1985
- 4. Bowle's.J.E., Foundation Analysis and design,4th edition,MGL,1998.
- 5. Jones.C.J.F.P., Earth reinforcement and soil structures, Butter worth &co., London, 1985
- 6. Arora.K.R., Soil mechanics and foundation Engineering, SPD, 2001

CE 460C : RURAL WATER SUPPLY AND ONSITE SANITATION SYSTEMS

				B. Tech. 4 th Year (Semester – VIII)			
L	Т	Р	Credits	Class Work		:	25 Marks
3	-		3	Examination		:	75Marks
				Total		:	100 Marks
				Duration	of	:	3 Hours
				Examination			

Course outcomes:

Upon successful completion of the course students will be able to

CO1	Design schemes for rural water supply.
CO2	Design schemes for distribution of water in rural areas.
CO3	Identify the simple methods for waste water treatment.

CO4 Plan schemes for final disposal of solid waste generated from sludge.

Prepare CO-PO/PSO Articulation Matrix, e.g.:

PURAN MUR

	PO1	PO2	PO3	PO4	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	3	2	3	3	3	3	3	3
CO2	3	3	3	2	3	3	2	3	3	3	3	3	3
CO3	1	2	1	3	3	3	1	3	3	3	3	3	3
CO4	CO4 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3												
	Unit-I												

Concept of environment and scope of sanitation in rural areas.Magnitude of problems of rural water supply and sanitation.Population to be covered, difficulties.National policy.

Water supply: Design population and demand loads. Various approaches of planning of water supply schemes in rural areas. collection of raw water from surface source. Specific practices and problems encountered in rural water supply. Relationships between diseases and water quality, hygiene and sanitation.

Unit-II

Improved methods and compact systems of treatment of surface and ground waters for rural water supply. Brief Details of multi-bottom settlers (MBS), diatomaceous earth filter, cloth filter, slow sand filter, chlorine diffusion cartridges. disinfection systems for rural areas, chlorination, Pumps, pipe materials, appurtenances and improved devices for use in rural water supply. Planning of distribution system in rural areas.

UNIT-III

Community and sanitary latrines. Various methods of collection and disposal of night soil.

Planning of waste water collection system in rural areas. Treatment and Disposal of waste water. Compact and simple waste water treatment units and systems in rural areas such as stabilization ponds, septic tanks, Imhoff tank, soak pit etc. Disposal of waste water soakage pits and trenches.

Unit-IV

Disposal of Solid Wastes. Composting, land filling, incineration, Biogas plants, sludge /seepage management systems.Rural health. Other specific issues and problems encountered in rural sanitation

Text Books

- 1. Excreta Disposal for Rural Areas and Small Communities. Wagner, Lanoix, WHO Publication.
- 2. Small Community water supplies Holket (ed.) John Wiley & Sons.

Reference Books

- 1. Manual on Water Supply and Treatment CPHEEO Govt. of India.
- 2. Water Treatment and Sanitation Simple Method for Rural Area' by Mann H.T. and

Williamson D.

- 3. 'Water Supply and Sewerage', by E.W.Steel&T.J.Mcghee, McGraw Hill.
- 4. 'Manual on Water Supply and Treatment', CPHEEO, Mini. Of Urban Development, Govt. of India.
- 5. 'Manual on Sewerage and Sewage Treatment', CPHEEO, Mini. Of Urban Development, Govt. of India

CE462C :INFRASTRUCTURE PLANNING AND DESIGN



L T P Credits

3 -- -- 3

B. Tech. 4th Year (Semester-VIII) Class Work : 25 Examination : 75 Total : 100 Duration of Examination : 3 h

: 25 Marks : 75 Marks : 100 Marks : 3 hours 111

Course Outcomes:

Students will know about:

- 1: basics of Infrastructure development.
- 2: various level of infrastructure development.
- 3: human resettlement and rehabilitation.
- 4: non private organization in Infrastructure development.
- 5: environmental impact of infrastructure projects.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	-	-	2	3	3	1	3	1	2	3	3	3	3
CO2	1	1	-	-	2	2	3	1	2	2	2	3	2	3	3
CO3	1	1	-	-	1	3	3	2	2	2	2	3	2	2	2
CO4	1	1	-	-	3	2	3	2	2	1	2	3	3	3	3
CO5	1	2	-	-	2	3	3	2	2	2	3	3	2	2	2

Unit-I

Meaning and scope of Infrastructure Development Management; Functions, components, stages and principles of Management in relation to Infrastructure Development, Infrastructure Development Issues at National, Regional and Human Settlement (Urban & Rural) levels. Process of decision making for Infrastructure development at National level, Infrastructure Development in India; policies, programmesand provisions in the National Five Year Plans, Recommendations of various committees, task forces and commissions from time to time.

Unit-II

Various National level organizations related to Infrastructure Development in terms of their background, functions, powers, setup and resources (with some case studies). Process of decision making for Infrastructure Development at State level, State policies; programmes and provisions in the various Five Year Plans, various State level organizations related to Infrastructure development in terms of their background, functions, powers, set-up and resources (with some case studies).

Unit-III

Process of decision making for Infrastructure Development at Human Settlements/local Level, Various local level organizations related to Infrastructure Development in terms of their background, functions, powers, setup and resources (with some case studies).

Role of NonGovernment and Private Organizations in Planning and Development of Infrastructure and their relationships with Local and State Governments.Importance and methods of Public-Private Partnership (PPP); Public/Citizen participation in Infrastructure Planning and Development, its scope, methods and limitations.



Unit-IV

Infrastructure planning process, and considerations for environmentally conscious plan. Environmental considerations in Infrastructure Planning. Environmental Impact Assessment: meaning, significance, parameters for EIA, framework; Environmental impact statement and related concepts, Techniques for Environmental Impact Assessment.

Strategies of preparation of Environment Plan of a city, Special surveyed and studies, Environment measures to be adopted in different areas.

Text/Reference Books:

1. Kulwant Singh ed. "Integrated Urban Infrastructure Development in India".

2. Ganesan S. ed. (2001), "Infrastructure Development and Financing".

3. Centre for Science and Environment (CSE), Citizens Fifth Report, (1999)

4. Report of Task Force on Planning and Development of Small and Medium Town and Cities (1997), Government of India.

5. Ministry if Urban Affairs & Employment (G.O.I.), (1996), 'Urban Development Plans Formulation and Implementation Guidelines', ITPI, New Delhi.

CE 464C : SOLID AND HAZARDOUS WASTE MANAGEMENT

				B. Tech. 4 th Yea	r (Semester – VIII)			
L	Т	Р	Credits		Class Work		:	25 Marks
3	-		3		Examination		:	75Marks
					Total		:	100 Marks
					Duration	of	:	3 Hours
					Examination			

Course outcomes:

Upon successful completion of the course students will be able to

CO1	Manage various types of solid waste.
CO2	Assess the risk of hazardous waste.
CO3	Minimise the production of waste.
CO4	Quantify the risk and provide methods to reduce it.

Prepare CO-PO/PSO Articulation Matrix, e.g.:

	PO1	PO2	PO3	PO4	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	1	3	1	3	3	2	3	3	2	3	2	3
CO2	2	3	3	2	3	3	2	3	3	3	3	3	3
CO3	1	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	1	3	3	3	3	3	3

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) If there is no correlation

UNIT – I

Solid Wastes: Origin, Analysis, Composition and Characteristics. Integrated Solid Waste Management System: Collection, Storage, Segregation, Reuse and Recycling possibilities, Transportation, Treatment / Processing and



Transformation Techniques, Final Disposal. Management of: Municipal, Biomedical, Nuclear, Electronic and Industrial Solid Wastes and the rules and regulations.

UNIT – II

Introduction to Hazardous wastes, Definition of Hazardous waste, the magnitude of the problem; Hazardous waste: Risk assessment,

UNIT – III

Environmental legislation, Characterization and site assessment, Waste minimization and resource recovery, Transportation of hazardous waste, Physical, chemical and biological treatment, Ground water contamination, Landfill disposal, Current Management Practices,

$\mathbf{UNIT} - \mathbf{IV}$

Environmental audit, Pollution Prevention, Facility Development and operation, Site Remediation: Quantitative risk assessment, site and subsurface characterization, Containment, remedial alternatives.

Text/Reference Books:

- 1. Solid and hazardous waste management by M N Rao and RaziaSultana, published by B S Publication.
- 2. Solid and hazardous waste management by S C Bhatia
- 3. Solid and hazardous waste management by Abdul Salam AKhalaf published by Lambert.
- 4. Solid and hazardous waste management by P M Cherry, published by CBS

CE466C : CONSTRUCTION EQUIPMENT AND AUTOMATION

			B. Tech. 4 th Year (Semester-VIII)	
Т	P	Credits	Class Work	: 25 Marks
		3	Examination	: 75 Marks
			FUKAN Total	: 100 Marks
			Duration of Examination	: 3 hours

Course Outcomes:

L 3

Students will know about:

- 1: Different types of equipments used for foundations and their applications.
- **2:** Formwork used in construction.
- **3:** Prefabrication and its application in construction.
- **4:** Different methods of prestressing.
- 5: Advanced techniques used for construction of pavement

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	-	-	3	2	1	1	2	1	1	3	2	3	2
CO2	2	1	-	-	3	3	1	1	2	2	1	3	2	3	2
CO3	1	1	-	-	3	2	1	1	2	1	1	3	2	3	2
CO4	1	1	-	-	3	2	1	1	2	1	1	2	2	3	2
CO5	1	1	-	-	3	2	1	1	2	1	1	3	2	3	2

Unit-I

Foundations: Techniques of construction of piles, Cessions, Wells, Cofferdams and diaphragms, Drilling blasting, Underpinning, Shoring and shuttering of foundation.



A Unit of Puran Murti Educational Society Approved by AICTE, Ministry of HRD Affiliated to Deenbandhu Chhotu Ram University of Science & Technology Affiliated to Haryana State Board of Technical Education, Panchkula Recognized Under Section 2 (f) byUGC

Unit-II

Formwork: Design and construction of different types of formworks and temporary structures, Stationary and slip formwork techniques, Formwork of special structures eg. Shells, Bridges, Towers etc.

Steel Construction: Shop and insitu construction techniques, Different connections, Clearances and tolerances, Erection of steel structures like bridges. Chimneys and trusses.

Unit-III

Prefabrication: Modular construction and standardization, Special equipments and plants for industrial production of prefabricated components.

Prestressing: Special equipments and plants for industrial production of prestressed components, Prestressing of bridge girders, Water tanks and special structures.

Unit-IV

Advanced pavement construction Techniques: Pavement construction using bitumen hot mix plant, Concrete road construction, Fibre reinforced pavement construction, Low cost road construction techniques.

Reference Books:

- 1. Soil Mechanics by Gopal Ranjan, New Age Publishers.
- 2. Mahesh Verma, Construction Equipment, its planning & Application, Metropolitan Book Co.(P) Ltd.,
- 3. Foundation Design Manual by Narayan V. Nayak
- 4. Prestressed concrete by Rajagopalan
- 5. Highway Engg by Justo and Khanna

CE468C : WATER POWER ENGINEERING

B. Tech. Final Year (Semester - VIII)

L	Т	Р	Credits	Class Work	:	25 Marks
3	-		3	Examination	:	75Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

COURSE OUTCOMES:

On completion of the course student will be able to

- 1. Understand concept of water power, relation of water power and hydrology, energy losses in hydraulics system, concepts of pump and motors.
- 2. Understand water power estimate, effect of storage, estimates of available water power and concept of water ways.
- 3. Understand concept of hydraulic turbines and efficiency of turbines.
- 4. Understand model of power house and working concept of power house.

UNIT - I

IntroductionWater Power, its development and use, relation of water power and hydrology. Distribution of fluid power, ISO symbols, energy losses in hydraulic systems.

Applications, basic types and constructions of Hydraulic pumps and motors, pump and motor analysis, Performance curves and parameters.

UNIT-II



Water Power Estimate: Collection and analysis of stream flow data, mass curve, flow duration curves, construction and utility of these curves, effect of storage and pondage, estimates of available water power. **Water way**: Intake, gates, valves, surges and its effects, penstocks, classification, design criteria, economical diameter, water hammer, surge tank.

UNIT-III

Hydraulic Turbines : Classification of turbines, Francis, Kaplan and Pelton Turbines, Component parts and their function, Draft tubes and their theory, Similarity laws and specific speed unit, Quantities, performance curves, Governing of turbines, selection of turbines, cavitation in turbines, efficiency of turbines.

UNIT-IV

Power House and Equipment: Location of power house, general arrangement of hydroelectric unit, Number and size of units, Power house substructure, and Pumped storage plant, Concept of tidal power plant.

Books/References

Irrigation and Water Power Engineering – B.C. Punmia (Laxmi Publication) Hydro Electric Engineering – Creager and Justin (Willay Institutional) Hydro Electric Engineering Practice – Brown, J.G. (Blackie and Sons Ltd., London)

			CE 47	OC : ENERGY E	FFICIENT BUILDINGS					
	B. Tech. 4 th Year (Semester – VIII)									
L	Т	Р	Credits		Class Work	:	25 Marks			
3	-		3		Examination	:	75Marks			
					Total	:	100 Marks			
					Durationof	:	3 Hours			
					Examination					

<u>Course Outcomes</u> :Upon successful completion of the course, the students will be able to:

CO1	Understand the factors determining the different types of Climates and the characteristics of
	various Climatic Zones.
CO2	Analyze and design the climatically conscious and energy efficient buildings in various climatic
	conditions and other restraints.
CO3	Apply Solar Energy, in their design of buildings.
CO4	Apply the concept of Green Building to their building design and apply the Greeen Building
	Rating Systems, for their evaluation.

<u>CO-PO/PSO Articulation Matrix</u> :

	PO1	PO2	PO4	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	1	2	-	2	-	2	2	2	2	1
CO2	2	3	1	3	-	2	-	1	2	2	2	1
CO3	2	2	2	3	1	-	2	1	1	2	1	1
CO4	2	1	1	3	2	1	2	2	2	2	1	1

UNIT I

Vernacular architecture: Basic functional requirements of a building, Use of local materials and needs of the local people.Contemporary Trends, Concept of Energy Efficient Buildings, Case Studies of heritage buildings and modern buildings.Domestic energy consumption and savingstrategies.Energy use in commercial buildings and savingstrategies.Scope of Energy Efficiency in buildings, by Solar Energy and Energy conservation.

Thermal Comfort Factors : Body's Heat Production, Body's Heat Loss, Thermal Balance of the Body, Heat Loss in various thermal environments, Bioclimatic Chart.



Heat Exchange of Buildings: Heat Loss and Heat Gain Calculations, Cooling and Heating by Air, Transmittance of Composite Walls, Thermal Gradients

UNIT II

Principles of Thermal Design: Thermal Quantities (Temperatue, Heat, Specific Heat, Latent Heat, Thermal Capacity and Calorific Value), Heat Flow Rate, Conductivity, Relevance of Density, Conductance, Multilayer Body, Surface Conductance, Transmittance, Sol-air Temperature, Solar gain Factor.

Global Climatic Factors : Tropical Climate, Solar Radiation (Quality and Quantity), Tilt of Earth's Axis, Radiation of Earth's surface, Measurement of Temperature, Humidity and Solar Radiation and Wind Velocity.

Climate and Climatic Zones: Weather and factors affecting weather, Climate, Climatic Zones (of India) and their characteristics, Comfort Conditions and Climate wise requirements.

UNIT III

Principles of Solar Passive Architecture and Planning: Site Conditions, Building Orientation, Plan Form, Building Envelope and its elements (Roof, Walls, Fenestrations, External Colour and Texture, Shading), Use of Insulation, Microclimate and the factors affecting the Microclimate,

Advanced Solar Passive Techniques : (Concept, Working Principle and variations and Controls of): Direct Gain, Thermal Storage Wall, : Trombe Wall, Water Wall, Solar Chimney assisted passive heating device, Thermal Storage Roof and Roof Pond, Roof radiation Trap, Solarium (Attached Green House / Sunspace, Isolated Gain.

Passive Cooling Techniques: (Concept, Working Principle and variations and Controls of): Evaporative cooling, Nocturnal Radiation Cooling, Passive desiccant Cooling, Induced Ventilation, Earth Sheltering/ Berming, Wind Tower, Earth Air Tunnels, Curved Roofs and Air Vents

UNIT IV

Design Guidelines: Natural building design consideration for Energy efficient design for different climatic zones i.e. Hot and Dry, Warm and Humid, Moderate Climate, Cold and Cloudy and Cold and Sunny Climate and Composite Climate.

Design Approach: Comfort Requirements and Physical Manifestation for different Climatic Zones, Advanced Techniques in different Climatic zones, Integrated Design Process.

Green Buildings: Energy and Resource conservation –Concept of green buildings and various Green Building Rating Systems and the detail study of LEED and GRIHA rating systems.

Text Books:

1. Manual of Tropical Housing and Building (Climatic Design), by Koenigsberger, Ingersoll, Mayhew, Szokolay, Orient BlackSawn, Hyderabad.

2. Moore F., Environmental Control System McGraw Hill, Inc., 1994.

3. Brown, G Z, Sun, Wind and Light: Architectural design strategies, John Wiley, 1985.

Reference Books

1. Cook, J, Award - Winning passive Solar Design, McGraw Hill, 1984.

CE472C: TRANSPORT PLANNING B. Tech. Final Year (Semester – VIII)

L	Т	Р	Credits	Class Work : 25 Marks	
4	-		4	Examination : 75Marks	
				Total : 100 Marks	
				Duration of Examination :3 Hours	

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COURSE OUTCOMES: The students will be able to attain the following outcomes at the end of this course

- 1. Carry out various surveys required for transportation planning.
- 2. Estimate trips generated from an area and their distribution.
- 3. Estimate traffic on a particular route by various modes.
- 4. Know fundamentals of relationship between land use and transportation.
- 5. Learn various fundamentals of evaluation of different transport plans.

CO-PO/PSO Articulation Matrix

		PO1	PO2	PO4	PO5	PO6	PO7	PO9	PSO1
Γ	CO1	1	1	3	-	2	-	1	1
Γ	CO2	3	3	1	2	2	-	-	2
Γ	CO3	3	3	1	2	2	-		2
Γ	CO4	2	3	1	2	2	-	-	1
	CO5	3	3	1		2	2		1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) "-": no correlation

UNIT I

Transportation Planning Process: Urban morphology - Urbanization and travel demand – Urban activity systems and travel patterns – Systems approach – Trip based and Activity based approach - Urban Transportation Planning – Goals, Objectives and Constraints - Inventory, Model building, Forecasting and Evaluation - Study area delineation – Zoning - UTP survey;

UNIT II

Trip Generation: Classification of trips, Factors governing trip generation and attraction; Zonal models; Trip generation estimation by multiple linear regression analysis, brief review of category analysis, advantages and limitations of these methods.

Trip Distribution: Methods of trip distribution. Growth factor models, Gravity model and Opportunity modes;

UNIT III

Modal split models – Mode choice behavior – Trip end and trip interchange models - Probabilistic models – Utility functions - Logit models - Two stage model.

Traffic assignment – Transportation networks – Minimum Path Algorithms - Assignment methods – All or Nothing assignment, Capacity restrained assignment and Multi path assignment - Route-choice behavior;

UNIT IV

Land use transportation models – Urban forms and structures - Location models - Accessibility – Land use models - Lowry derivative models - Quick response techniques - Non-Transport solutions for transport problems;

Preparation of alternative plans - Evaluation techniques – Plan implementation - Monitoring - Financing of Project – urban development planning policy –

Text/Reference Books:

- 1. Hutchinson, B.G., "Principles of Urban Transport System Planning"– McGraw Hill Book Co.
- 2. Kadiyali, L.R., "Traffic Engineering and Transportation Planning"– Khanna Publication.
- 3. Institute of Traffic Engineers "An Introduction to highway Transportation Engineering".
- 4. Introduction to Transport Planning by Bruton, M.J., Hutchinson Technical Education, London.



CE 474C : EARTHQUAKE RESISTANT STRUCTURES

B. Tech. 4th Year (Semester – VIII)

L Т Р Credits 4 4

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Class Work	:	25 Marks
Examination	:	75Marks
Total	:	100 Marks
Duration of Examination	:	3Hours

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Course Outcomes :

At the end of the course, the student will be able to:

CO1	Fundamentals of earthquake resistant structures
CO2	Design masonry and framed structures for earthquake loading
CO3	Deliver safety measures and can use different techniques to strengthen the building
CO4	Apply codal provisions on masonry and framed structures including special structures

Prepare CO-PO/PSO Articulation Matrix, e.g.:

							-					
	PO1	PO2	PO3	PO4	PO6	PO8	PO9	PO10	PO 11	PSO1	PSO2	PSO2
CO1	3	2	1	1	1	1	1	1	2	2	2	2
CO2	2	3	1	1	1	2	1	2	1	1	2	3
CO3	3	2	2	-		1	-	2	1	1	2	3
CO4	2	2	-	1		1	1	1	1	2	2	3

UNIT I

Introduction: Engineering seismology, Seismic zones of India, Earthquake and its causes, Types of waves, location of earthquakes, seismograph, Impact of Earthquake, base isolation.

Theory of Vibrations: Free Body Diagrams, Undamped single degree of freedom systems, Damped single degree of freedom system, Response to single degree of freedom system to harmonic loads.

UNIT II

Introduction: Provisions of IS:4326

Seismic performance, repair and strengthening: Identification of seismic damage in RCC Buildings, Effect of Structural Irregularities on Performance, Criteria for Repair and Strengthening

UNIT III

Introduction to Structural Failures due to Earthquake

Introduction to IS: 1893 - 2002: Seismic analysis and design of Framed structures by equivalent lateral load procedure.

UNIT IV

Introduction to Ductile Detailing of Structures, Design of Beams and Columns as per IS 13920

Concept of Soft storey, shear walls, seismoresistant building architecture

Text Book

- 1. Dynamics of Structures, Clough and Penzian, McGraw Hill Publishing Co., New York
- 2. Structural Dynamics (Theory and Computation) Mario Paz, CBS Publishers and Distributors.
- 3. Earthquake Resistant Design of Structures, Pankaj Agarwal, PHI learning Private Limited

Reference Books

- 1. Structural Dynamics (An Introduction to computer methods), Roy R. Carig, Jr., John Wiley & Sons
- 2. Structural Dynamics Anil Kr. Chopra



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CE 476C :DESIGN OF BRIDGES B. Tech. 4th Year (Semeste TTTT

i rear (Semester –	V 111)
Class W	ork :
Examina	tion :

25 Marks 75Marks Total 100 Marks Duration of Examination : 3 Hours

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Course Outcomes :

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At the end of the course, the student will be able to:

Credits

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CO1	Understand the bridge identify the loading over the bridges and make selection of bridge and
	bridge site
CO2	Will be able to design T beam, deck slab and culverts using latest IS
CO3	Understand the importance of sub structural components of the bridge.
CO4	Understand the importance of bearings their analysis and design.

Prepare CO-PO/PSO Articulation Matrix, e.g.:

	PO1	PO2	PO3	PO4	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	1	-	1	1	2	1	3	2
CO2	2	2	3	3	1	-	1	1	2	1	1	3	2
CO3	3	3	3	3	1	1	2	1	1	1	2	3	2
CO4	1	2	2	1	1	-	-	1	-	-	2	3	2

Unit I

Introduction to Bridges: Definition, components of a bridge, classifications, importance of bridges. Need for investigations, selection of bridge site, preliminary data to be collected, design discharge and its determination, linear waterway, economical span, vertical clearance above HFL, scour depth, choice of bridge type.

Standard Specifications: Road bridges, I.R.C. loadings, code provisions on width of carriageway, clearances, loads considered etc. Standard specifications for railway bridges, Railway bridge code.

Unit II

Analysis and Design Bridges: Analysis and design of Deck slab, T-beam bridge using Pigeauds method, Hendry-Jaegar method, Courbon's theory and Guyon-Massonet method and RCC culvert.

Unit III

Sub Structure: Types of piers and abutments, design forces, design of piers and abutments.

Unit IV

Bearing and Joints: Various types of expansion bearing and fixed bearings, elastomeric bearings, joints and their types, design of bearings.

Construction Method: Inspection, maintenance and construction of bridges, case studies of recently constructed major bridges.

Text Books

- 1. Elements of Bridge Engineering, D. Johnson Victor, Oxford and IBH Publishers, New Delhi.
- 2. Design of Steel Structures, A.S. Arya and J.L. Ajmani ,Nem Chand Brothers, Roorkee.
- Design of Concrete Bridges, Khanna Publishers, New Delhi, Vazirani&Ratwani 3.

Reference Books

Analysis, Design and Construction of Bridges by V.K. Raina, Tata McGraw Hill 1.



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CE478C: PUBLIC TRANSPORTATION SYSTEMS

			B. Tech. 4 th Year (Semester – VIII)			
Т	Р	Credits	Class Work		:	25 Marks
-		3	Examination		:	75Marks
			Total		:	100 Marks
			Duration	of	:	3 Hours

Examination

COURSE OUTCOMES: At the completion of this course the students will develop the ability to

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- 1. Understand basic characteristics of public transport.
- 2 Learn concepts of transit network planning and scheduling.
- 3 Carry out transit performance evaluation.
- 4 Design bus stops, terminals or other facilities.

<u>CO-PO/PSO Articulation Matrix</u>

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		PO1	PO2	PO4	PO6	PO11	PSO1	PSO2	PSO3
	CO1	3	1	2/	-	-	1	-	-
	CO2	3	3	2	1	1	1	2	1
	CO3	2	3	1	-	1	1	-	-
	CO4	2	3	2	1	1	1	2	1
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1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) "-": no correlation

UNIT – I

Public Transport: Definitions, modes of public transport and comparison, public transport travel characteristics, trip chaining, technology of bus, rail, rapid transit systems, basic operating elements;

UNIT – II

Transit Network Planning: Planning Objectives, principles, considerations, transit lines – types, geometry and characteristics, transit routes and their characteristics, timed transfer networks, prediction of transit usage, evaluation of network, accessibility considerations; Transit Scheduling: Components of scheduling process, determination of service requirements, scheduling procedure, marginal ridership, crew scheduling;

UNIT – III

Transit Agency and Economics: Organizational structure of transit agency, management and personnel, transit system statistics, performance and economic measures, operations, fare structure;

$\mathbf{UNIT} - \mathbf{IV}$

Design of Facilities: Design of bus stops, design of terminals – principles of good layout, types of layout, depot location, twin depot concept, crew facilities and amenities.

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Text/reference Books:

- 1 Public Transport: Its Planning, Management and Operation, By Peter R. White, Routledge, Taylor and Francis group.
- 2 Public Transport Planning and Management in Developing Countries, 1st Edition, by AshishVerma, T.V. Ramanayya, CRC press.
- 3 Ceder, Avishai. Public Transit Planning and Operation: Theory, Modeling and Practice. Burlington, MA: Elsevier, 2007. ISBN: 9780750661669.
- 4 Transit Capacity and Quality of Service Manual, 2nd ed. TCRP Report 100. Transportation Research Board, 2003.
- 5 Vuchic, Vukan. Urban Transit: Operations, Planning and Economics. New York, NY: Wiley, 2005. ISBN: 9780471632658.
- 6 Bruun, Eric. Better Public Transit Systems: Analyzing Investments and Performance. Washington, DC: American Planning Organization, 2007. ISBN: 9781932364484.
- 7 Fielding, Gordon. Managing Public Transit Strategically: A Comprehensive Approach to Strengthening Sales and Monitoring Performance. New York, NY: Jossey-Bass, 1987. ISBN: 9781555420680.

CE 480C :DYNAMICS OF STRUCTURES B. Tech. Final Year (Semester – VIII)

L	Т	Р	Credits	Class Work	:	25 Marks
4	-	-	4	Examination	:	75 Marks
				Total	:	100 Marks
				Duration of Examination	:	3 Hours

Course Outcomes :

At the end of the course, the student will be able to:

CO1	Apply the basics of dynamics into structural engineering
CO2	understand the different single and multi-degree of freedom system.
CO3	Deliver safety measures and use different techniques to strengthen the structure.
CO4	Apply codal provisions on framed structures.

Prepare CO-PO/PSO Articulation Matrix, e.g.:

	PO1	PO2	PO3	PO4	PO6	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	2	-	1	1	1	-	1	1	2	2	3
CO2	3	1	2	2	2	1	1	2	2	1	2	2
CO3	3	2	1	-	1	-	-	1	-	1	2	2
CO4	2	1	1	1	1	2	1	1	1	2	2	2

Unit I

Seismology:Introduction, plate tectonics, earthquake distribution and mechanism, seismicity, seismic waves, earthquake magnitude and intensity, seismic zoning and seismometry.



Single Degree of Freedom Systems: Various types of dynamic loads, vibration of single degree of freedom system, Free and forced vibrations, types of damping, critical damping. Transmissibility, vibration measuring instruments, response spectrum.

Unit II

Multi-degrees of Freedom(MDOF)Systems:

Equation of Motion, normal modes and natural frequencies, semi-definite systems, dynamic vibration absorbers, vibration dampers, principle of orthogonally, Stodolas method, Holzer's method, matrix method, modal analysis and its limitations. Mode super position method.

Unit III

Seismic Analysis and Design:

General principles, assumptions, seismic coefficient method, response spectrum method, strength and deflection, design criterion for structures, significance of ductility, design and detailing for ductility, codal provisions, design examples.

Seismic Performance, Repair and Strengthening:

Methods for assessing seismic performance, influence of design ductility and masonry infills, criterion for repair and strengthening techniques and their applications, additions of new structural elements.

Unit IV

Vibrational Control:

General features of structural control, base isolation, active and passive control system. Earthquake resistance design as per I.S.:1893, I.S.4326 and I.S.13920.

TEXT / REFERENCE BOOKS:

- 1. Mario Paz, and William Leigh, Structural Dynamics, CBS, Publishers, 1987.
- 2. Roy Craig, Jr. Structural Dynamics, John Wiley & Sons, 1981.

3. A.K. Chopra "Dynamics of Structures Theory and Application to Earthquake Engineering" Pearson Education, 2001.

CE482C: ROAD SAFETY AND ENVIRONMENT B. Tech. 4th Year (Semester – VIII)

L	Т	Р	Credits	Class Work	:	25 Marks
4	-		4	Examination	:	75Marks
				Total :	100) Marks
				Duration of F	lxan	nination:3 Hours

COURSE OUTCOMES:

After completion of this course students will be able to

- 1. Know about road safety scenario in India and the need of planning and design for safety.
- 2. Perform crash investigation and diagnose the issues involved.
- 3. Understand the concepts of various stages of road safety audit and methods of prioritization of audit recommendations.



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4. Audithighways for safety and suggest improvements.

CO-PO/PSO Articulation Matrix

	PO1	PO2	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO2
CO1	-	1	1	-	-	1	-	-	-	-
CO2	1	2	3	-	2	-	-	2	-	1
CO3	2	3	2	2	-	-	-	-	-	-
CO4	1	3	3	-	3	2	2	3	3	2

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) "-": no correlation

UNIT – I

Planning for Network, Land Use and Road Environment for Safety, Designing for Safety: Road Link Design, Junctions.

Introduction to Road Safety Engineering and Crash Investigation, Human and other Factors Relating to Crashes/Accidents, Crash/Accident Investigation & Crash Problem Diagnosing, determination of pre-crash speed using skid marks, Crash Problems into Solutions &Crash Investigation Reporting, Black spot identification, safety performance functions and accident modification factors, Crash/Accident Costing, Economic Appraisal.

UNIT – II

Road Safety Auditing- An Introduction, How to Conduct Road Safety Audit, Design Stage Road Safety Audit, Road Safety Audits of Land Use Developments, Traffic Control Devices & Safety, Needs of Different Road Users, Road Safety Audit in Road Works & Pre Opening Safety Audit.

Street Lighting & Traffic Signals, Provisions for NMT Vehicles in India, Safety Provisions for Pedestrians & Cyclists, Road Signs and Pavement Markings.

UNIT – III

Safe System Approach- A Global Perspective, Speed Management & safety, Safe System and Speed & Assessing speed limit, Type of speed limit & Speed zone signing Infrastructure to support safe speed feedback and enforcement.

Hazard Management Organizational commitment & encouraging RSA, Road Safety Audit Checklist. UNIT – IV

Site Visits and Preparation of the Audit Reports.

Risk Assessment & Prioritization of audit recommendations, Solutions and effectiveness & Corrective, Action Report.

Text Books

- 1. Highway Engineering by Khanna and Justo, Nem Chand & Brothers, Roorkee
- 2. Highway Engineering by L.R. Kadyali, Nem Chand & Brothers, Roorkee

Reference Books



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- 1. Highway Engineering by Oglesby and Hews
- 2. Transportation Engineering by G.V. Rao, Tata McGraw Hill Publisher, New Delhi
- 3. Traffic Engineering by Matson, Smith&Hurd
- 4. Road safety audit Manual

CE-484C:ADVANCED STRUCTURAL DESIGN & DETAILING

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L	Р	Credits	Class Work	:	25 Marks
4		4	Examination	:	75 Marks
			Total	:	100 Marks
			Duration of Examination	:	3 Hours

COURSE OUTCOMES:

- 1. Students will be able to use limit state method of design
- 2. Students will be able to design buildings as per earthquake zone
- 3. Apply the basics of design standards on earthen and masonry structures
- 4. Apply codal provisions on masonry and framed structures including special structures

USE OF INDIAN STANDARDS IS ALLOWED IN EXAMINATION

UNIT-I

Introduction to limit state method of design, provisions in the Indian standard codes for loading wind loads and seismic

loads, design and detailing of concrete structures.

BIS Handbook for design, Examples of design using handbook SP-16.

UNIT-II

Design of Structures as per I.S. 1893 for Earthquake Resistant Design Construction.

Design and Detailing Requirements as per 4326-1993.

UNIT-III

Design and detailing of Earthen Buildings as per 13827-1993

Design and detailing of Masonry Structures as per I.S. 13828-1993

UNIT-IV

Design and Ductile Detailing of R.C.C. Structures of R.C.C. Structures as per I.S. 13920-1993

Repair and Seismic Strengthening of Building as per I.S. 13935-1993

References:

- 1. Pillai and Menon, Reinforced Concrete Design
- 2. Jain, A.K. Reinforced Concrete, Limit State Method of Design.
- 3. Punmia, B.C. reinforced Concrete Structures, Vol-II.
- 4. B.I.S. Codes 1893, 4326, 13827, 13828, 13920, 13935



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CE486C: APPLIED STAISTICS TO TRANSPORTATION ENGINEERING

L	Р	Credits	Class Work	:	25 Marks
4		4	Examination	:	75 Marks
			Total	:	100 Marks
			Duration of Examination	:	3 Hours

COURSE OUTCOMES: at the end of this course students will be able

- 1. To understand applications of various probability distributions in transportation engineering.
- 2. To understand theory of sampling, design of experiments and hypothesis testing concepts.
- 3. To perform regression modeling and testing of model fit.

UNIT I

Introduction to statistical methods, scope aim and limitations, sample, attribute and types of data, sources and collection of data.Accuracy of data.Representation and summarizing data.Frequency distribution, histogram and frequency curves. Ogive curve, Measure of central tendency – arithmetic mean, median and mode dispersion- range, standard deviation, variance and co-efficient of variation, skewness and kurtosis.

UNIT II

Introduction to probability & statistics for Traffic Engineering Design – Introduction, Random variables and statistical measures: arithmetic mean, measures of dispersion, basic laws of probability, probability laws for discrete random variables: binomial and Poisson distribution, probability laws for continuous random variables: normal distribution, Poisson distribution.

UNIT III

Sampling Techniques – objective, basics of sampling, advantages of sampling, sampling techniques, sampling distributions – sampling distribution of the sample mean, central limit theorem, chi square, t and F – distributions. Sampling error, sample size and design. 10 Hours Module -4 Statistical decisions – point estimation, properties of parameters, Testing of Hypothesis – Type I and II errors. Tests of significance – tests for mean and variance.Tests for proportions.

UNIT VI

Chi-square test of goodness of fit, student's t test, Confidence interval. Curve fitting by the method of least squares, Linear correlation & regression, multiple linear regression. Analysis of variance Use of soft-wares in statistical analysis – SPSS

Reference books:

- 1 Gupta S. P. and Kapoor V. K., Fundamentals of Statistics, Sultan Chand and Sons, Delhi 02(2005)
- 2 Hines, W. W. and Montgomery, D. C., et. al.; "Probability and Statistics in Engineering and Management Science", John Wiley and Sons, New York, (1990).
- 3 Freund, J. E.; "Mathematical Statistics", PHI, New Delhi, (1990)
- 4 Montgomery, D. C.; "Design and Analysis of Experiments", 5th edition, John Wiley and Sons, INC., New York. (2001).
- 5 Johnston, J. and Dinardo, J.; "Econometric Methods", 4th edition, McGraw-Hill International Editions, (1997).
- 6 Benjamin, J. R. and Cornell, C. A.; "Probability Statistics and Decision for Civil Engineers", McGraw-Hill, (1970).